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SOLES

Abstract:

Resilient ground-engaging support structure for an article to move over the ground, e.g. a footwear sole or heel, the structure having a continuous or discontinuous ground-engaging surface layer (8) spaced from an inner layer (5) by resilient walls (10, 11) which define hollows (4) with the surface (8) and inner layers (5), the hollows (4) extending obliquely from the inner layer (5) at least when the structure engages the ground in use whereby the structure imparts impetus to the article in a desired direction over the ground when disengaging from the ground.

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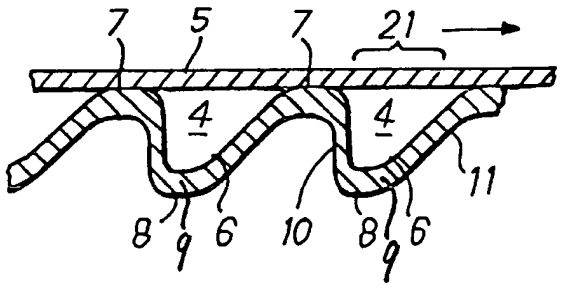

(57) Abstract

Resilient ground-engaging support structure for an article to move over the ground, e.g. a footwear sole or heel, the structure having a continuous or discontinuous ground-engaging surface layer (8) spaced from an inner layer (5) by resilient walls (10, 11) which define hollows (4) with the surface (8) and inner layers (5), the hollows (4) extending obliquely from the inner layer (5) at least when the structure engages the ground in use whereby the structure imparts impetus to the article in a desired direction over the ground when disengaging from the ground.

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SOLES

The present invention relates to resilient ground-engaging support structures for articles to be moved over the ground, e.g. to shoe soles and mainly to shoe soles and heels of the "shover" type.

The invention is explained hereinafter with the aid of the accompanying drawings, in which :

Figure 1 is a schematic longitudinal section view of part of a conventional "shover" shoe sole;

Figure 2 is a similar view of part of a "shover" shoe sole according to the invention;

Figure 3 is a similar view of part of another "shover" shoe sole according to the invention;

Figure 4a is a similar view of part of a conventional sculptured shoe sole;

Figure 4b is a similar view of part of a sculptured shoe sole according to the invention;

Figure 5 is a similar view of part of another "shover" shoe sole according to the invention;

Figure 6 is a schematic transverse sectional view of the Figure 2 sole;

Figure 7 is a schematic longitudinal section view of a "shover" sole according to the invention for a rocking horse; and

Figure 8 is a schematic longitudinal section view of another "shover" shoe sole according to the invention.

Conventional shoe soles and/or heels of the "shover" type are flexible moulded bodies which give the shoe, and therefore the foot, a forward impetus or impulse, as explained with reference

to Figure 1 wherein 1 is part of the sole, 2 are ridges and/or studs, and the arrow indicates the direction of forward movement. When a shoe provided with such a sole touches and is pressed onto the ground, the shoe moves slightly forward relative to the contact surfaces between the ridges and the ground 3, so that the ridges, because of their shape, bend backwards relative to the remainder of the sole.

A shoe with a sole according to the aforementioned principle is a very comfortable walking shoe. One of its main disadvantages, however, is the inherent poor resistance to wear of the sole. This is because, as soon as the foot is lifted from the ground, the usually rather soft ridges will immediately relax into their uncompressed state and, in doing so, trail over the ground. Therefore, the advantages of the aforementioned sole will rapidly diminish with time, unless one uses a relatively hard material or large contact surfaces 3, each of which defeats the object of flexibility and comfort.

In one of its aspects the present invention can retain the advantages of aforementioned conventional "shover" sole, but reduce or avoid its disadvantages.

The present invention provides a footwear sole or heel having a continuous or discontinuous ground-engaging surface layer spaced from an inner layer by resilient walls which define hollows with the surface and inner layers; this structure can be such (with the resilient walls and hollows extending obliquely from the inner layer at least when the sole or heel engages the ground in use) as to impart to the sole or heel an impetus in a desired direction on disengagement from the ground.

Thus in Figure 2 the solid ridges or studs 2 of Figure 1 are replaced by hollow ridges or studs 6, the hollows or cavities 4 being defined between inner layer 5 and the resilient walls 10, 11 and troughs 8 of a corrugated sheet; the crests 7 of the latter sheet are preferably sealed to inner layer 5 and its troughs 8 provide at least part of the discontinuous ground-engaging layer 9 of the sole. The cavities 4 may be filled with air, or with flexible plastics or rubber foam.

The construction of Figure 2 makes it possible to employ a very hard-wearing rubber or plastics material for the ridges or studs without losing flexibility and comfort. It also makes it feasible to use relatively large contact surfaces 8. Moreover, the thickness of the trough walls 9 and/or that of the forward walls 11 may be greater than that of the rearward walls 10.

Another embodiment of the invention is shown in Figure 3 wherein the top part (inner layer and resilient walls) of the sole 12 is like the sole of Figure 1, the bottom part 13 being a conventional sole of any desired material or type, the two parts being sealed together.

According to the invention, as material for the sole and its ridges or studs, one may use rubber, polyurethane, etc.; one may use different materials for different parts, e.g. rubber for 12 (Figure 3) and polyurethane for 13.

In shoe soles and heels according to the invention, only part of the sole and/or heel need be provided with the hollow ridges or studs.

The cavities 4 are preferably closed laterally, e.g. at each side, so that the cavities are substantially completely

enclosed all round.

The principles of this invention are not restricted to the "shover" type soles mentioned before, but may also be applied to more conventional "sculptured" soles; thus the sole of Figure 4a (conventional) may be replaced by that of Figure 4b according to the invention.

Figure 5 shows another embodiment of a "shover" shoe sole according to the invention; in the various Figures of the drawings like reference numerals denote like parts.

The top part 21 (inner layer) of one or more of the cavities in soles according to the invention may be porous or perforate, providing a comfortable ventilated shoe.

When used for a runner's (e.g. sprinter's) shoe, a sole like that of Figure 2 makes higher speeds a possibility, a part of the potential energy when the foot collides with the ground being transformed into forward kinetic energy.

One may say that the difference between soles according to the invention and prior art soles has much in common with the difference between pneumatic tyres and solid rubber tyres.

Shoe soles and heels according to the invention can give overall support to the foot, even on rough ground.

A shoe may have only its heel equipped according to the invention, e.g. in the cases where the heel is below the level of the front part of the sole.

It can be desirable, in any shoe embodiment according to the invention, to have the hollow ridges and/or studs on the heel act contrary to those on the sole (i.e. the heel cavities incline in the opposite sense to that of the sole cavities).

The lateral walls of the hollows 4 need not be vertical; they may taper towards the ground (as at 23 in Figure 6) or away from the ground.

As shown in Figure 8, the inner layer, ground-engaging layer and resilient walls may form an integral sole or heel according to the invention.

The present invention is not limited in its application to footwear, e.g. to shoe, boot etc. soles and heels, but is applicable generally as a ground-engaging support structure for any article to be moved over the ground; thus a "rocking horse" or other rocking toy, provided with a sole or soles like that of any of Figures 2, 3, 4b, 5, 6 and 8 has a forward motion; Figure 7 illustrates such a toy, the double arrow indicating the direction of movement. The walls 33 could be arranged in such a way, that the toy, whilst rocking, goes round in a circle; one way of achieving this, is to provide one part of the "sole" with forward movement and another with rearward movement. Jumping toys provided with such a "sole", (flat or curved as in Figure 7) also have forward-moving properties.

Accordingly the invention also provides resilient ground-engaging support structure for an article to move over the ground, the structure having a continuous or discontinuous ground-engaging surface layer spaced from an inner layer by resilient walls which define hollows with the surface and inner layers, the hollows extending obliquely from the inner layer at least when the structure engages the ground in use whereby the structure imparts impetus to the article in a desired direction over the ground when disengaging from the ground.

C L A I M S :

1. A footwear sole or heel having a continuous or discontinuous ground-engaging surface layer spaced from an inner layer by resilient walls which define hollows with the surface and inner layers.

2. A footwear sole or heel according to claim 1 wherein the hollows contain a resilient filling.

3. A footwear sole or heel according to claim 1 or 2 wherein the said resilient walls are integral with the surface or inner layer.

4. A footwear sole or heel according to claim 3 wherein the inner and surface layers and resilient walls are integral.

5. A footwear sole or heel according to any preceding claim wherein the resilient walls and ground-engaging surface layer are constituted by an integral sheet formed with crests and troughs, crests engaging with the inner layer and troughs providing at least part of the ground-engaging surface layer.

6. A footwear sole or heel according to any preceding claim wherein the hollows are substantially completely closed on all sides.

7. A footwear sole or heel according to any preceding claim wherein hollows extend obliquely from the inner layer at least when the sole or heel engages the ground in use, whereby the sole or heel imparts impetus to the footwear in a desired direction on disengage-

ment from the ground.

8. Resilient ground-engaging support structure for an article to move over the ground, the structure having a continuous or discontinuous ground-engaging surface layer spaced from an inner layer by resilient walls which define hollows with the surface and inner layers, the hollows extending obliquely from the inner layer at least when the structure engages the ground in use whereby the structure imparts impetus to the article in a desired direction over the ground when disengaging from the ground.

FIG. 1

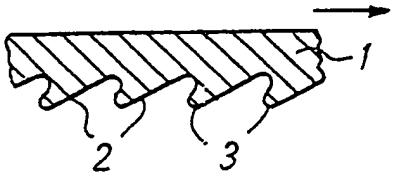


FIG. 2

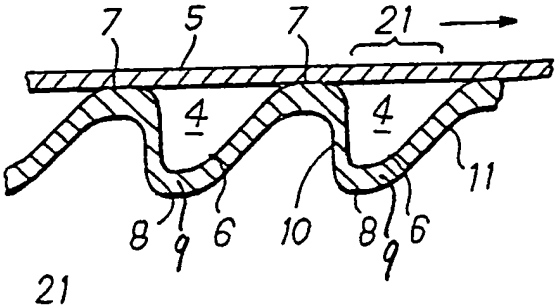


FIG. 3

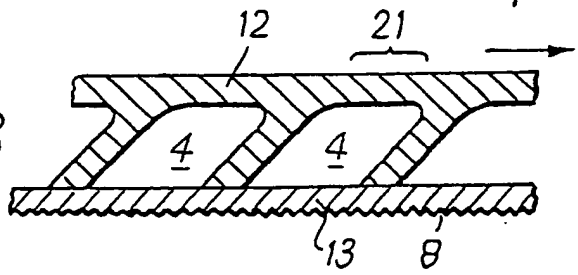


FIG. 4a

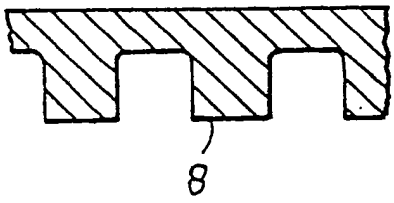


FIG. 4b

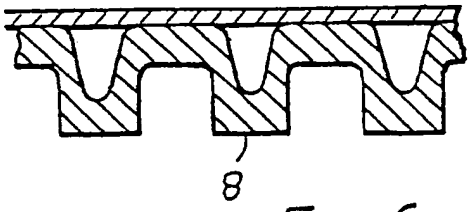


FIG. 5

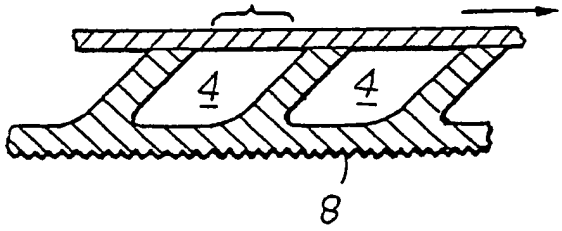


FIG. 6

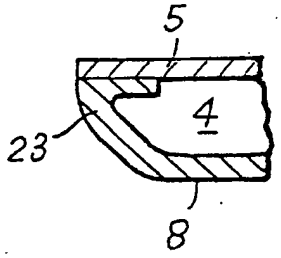


FIG. 7

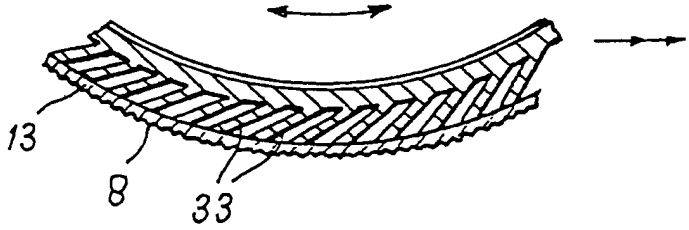
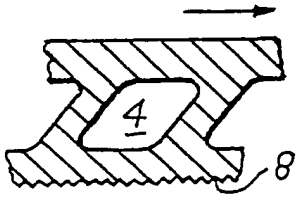


FIG. 8



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 80/00192

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl.[3] A 43 B 13/18

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
Int.Cl.[3]	A 43 B

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
	US, A, 3087262, published April 30, 1963 L. Russell --	1-3,6,7,8
	US, A, 3079707, published March 5, 1963 M. Hack --	1,3,6-8
	US, A, 3172217, published March 9, 1965 B. Colman --	1,3,6-8
	US, A, 2710461, published June 14, 1955 N. Hack --	1,3,5
	US, A, 3087261, published April 30, 1963 L. Russell --	1-3
	US, A, 2150057, published March 7, 1939 A. Fisch --	1
	US, A, 4133118, published January 9, 1979 G. Khalsa --	1
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IV. CERTIFICATION

Date of the Actual Completion of the International Search [3]	Date of Mailing of this International Search Report [3]
15th January 1981	28th January 1981
International Searching Authority [1]	**Signature of Authorized Officer [20]**
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	US, A, 2553616, published May 22, 1951 G. Walls --	1
	US, A, 1373287, published March 29, 1929 A. Ammann ------	4